IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) A Viterbi bit detection method for detecting the bit values of bits of a channel data stream stored on a record carrier along an N-dimensional channel tube, N being at least two, of at least two bit rows one-dimensionally evolving along a first direction and being aligned with each other along at least a second of N-1 other directions, said first direction together with said N-1 other directions constituting an N-dimensional lattice of bit positions, said Viterbi bit detection method comprising the steps of:~~ application of~~

applying a row-based one-dimensional Viterbi bit detection method independent for each of the bit rows of said channel tube~~,~~ ;~~wherein:~~

– ~~calculation of the~~calculating branch metrics for all possible state transitions in a Viterbi trellis of a one-dimensional row-based Viterbi detector, said transitions representing a number of subsequent bits in said bit row, said bits being the central-row bits of a cluster of the N-dimensional lattice of bits, ~~is~~ said calculating being based on the difference of the received HF signal value with respect to a reference level, wherein said reference level depends on all bits of said cluster, said cluster comprising, in addition to the central-row bits, a

number of primary ~~neighbouring~~ neighboring bits in each of a number of ~~neighbouring~~ neighboring bit rows on each side along said N-1 other directions of said central bit row along which the one-dimensional Viterbi bit detection method is applied, and wherein preliminary bit decisions for the primary ~~neighbouring~~ neighboring bits in the ~~neighbouring~~ neighboring bit rows are used for determining the reference level to be used for calculating said branch metrics~~,~~ ; and

– ~~selection of~~selecting the bit value for the central bit of said cluster of the N-dimensional lattice of bits, corresponding with said received HF signal value, ~~is~~ based on the calculated branch metrics.

2. (Currently Amended) ~~Method~~ The method as claimed in claim 1, wherein the preliminary bit decisions on said primary ~~neighbouring~~ neighboring bits in the ~~neighbouring~~ neighboring bit rows are obtained by threshold detection using a slicer level.

3. (Currently Amended) ~~Method~~ The method as claimed in claim 1, wherein the bit values of the central row constituting each of said branches in the Viterbi trellis of the central row are used for determining the preliminary bit decisions on said primary ~~neighbouring~~ neighboring bits in the ~~neighbouring~~ neighboring bit rows.

4. (Currently Amended) ~~Method~~ the method as claimed in claim 1, wherein the preliminary bit decisions on the primary ~~neighbouring~~ neighboring bits are obtained by evaluation of a predetermined criterion which is determined by the sum over all the primary ~~neighbouring~~ neighboring bits, said sum comprising terms related to a subcriterion that is based on the differences of the HF signal value and a reference HF signal value corresponding to the bit cluster of each single primary ~~neighbouring~~ neighboring bit, ~~which~~ said evaluation ~~is~~ being done for all possible bit units obtained for all possible values of said primary ~~neighbouring~~ neighboring bits, and wherein the bit unit with the lowest value of said predetermined evaluation criterion is selected.

5. (Currently Amended) ~~Method~~ The method as claimed in claim 4, wherein said subcriterion relates to the squared value of the difference of the HF signal value and a reference HF signal value corresponding to the bit cluster of each single primary ~~neighbouring~~ neighboring bit.

6. (Currently Amended) ~~Method~~ The method as claimed in claim 4, wherein said subcriterion relates to the absolute value of the difference of the HF signal value and a reference HF signal value

corresponding to the bit cluster of each single primary ~~neighbouring~~ neighboring bit.

7. (Currently Amended) ~~Method~~ The method as claimed in claim 1, wherein the preliminary bit decisions on the primary ~~neighbouring~~ neighboring bits are obtained by use of soft-decision information.

8. (Currently Amended) ~~Method~~ The method as claimed in claim 1, wherein further preliminary bit decisions on secondary ~~neighbouring~~ neighboring bits, being the ~~neighbouring~~ neighboring bits of said primary ~~neighbouring~~ neighboring bits but not being part of the central bit row of said cluster, are used for determining the preliminary bit decisions on said primary ~~neighbouring~~ neighboring bits.

9. (Currently Amended) ~~Method~~ The method as claimed in claim 1, wherein said branch metrics are determined as the squared difference between the received HF signal value for the central bit of said cluster and a reference HF signal value depending on the bit values of all bits of said cluster.

10. (Currently Amended) ~~Method~~ The method as claimed in claim 1, wherein said branch metrics are determined as the absolute value

of the difference between the received HF signal value for the central bit of said cluster and a reference HF signal value depending on the bit values of all bits of said cluster.

11. (Currently Amended) ~~Method~~ The method as claimed in claim 1, wherein N is 2 and wherein the bit values of bits of a channel data stream are stored on a record carrier along a two-dimensional channel strip of at least two bit rows one-dimensionally evolving along a first direction and aligned with each other along a second direction, said two directions constituting a two-dimensional lattice of bit positions.

12. (Currently Amended) ~~Method~~ The method as claimed in claim 11, wherein the 2D lattice of bits is ~~of the~~a square ~~type~~configuration.

13. (Currently Amended) ~~Method~~ The method as claimed in claim 11, wherein the 2D lattice of bits is ~~of the~~a hexagonal ~~type~~configuration.

14. (Currently Amended) ~~Method~~ The method as claimed in claim 13, wherein said channel strip comprises at least three bit rows and wherein said hexagonal ~~cluster~~ configured 2D lattice of bits comprises seven bits, three being located in the central bit row

and two being located in an upper and lower primary ~~neighbouring~~ neighboring bit row, respectively.

15. (Currently Amended) ~~Method~~ The method as claimed in claim 13, wherein preliminary bit decisions on secondary ~~neighbouring~~ neighboring bits are used for determining the preliminary bit decisions on said two ~~neighbouring~~ neighboring primary bits in each primary ~~neighbouring~~ neighboring bit row.

16. (Currently Amended) ~~Method~~ The method as claimed in claim 15, wherein the two primary ~~neighbouring~~ neighboring bits of the hexagonal cluster located in the upper and lower primary ~~neighbouring~~ neighboring bit row, respectively, are grouped as primary ~~neighbouring~~ neighboring bit unit each bit unit being surrounded by eight ~~neighbouring~~ neighboring bits, five of which being secondary ~~neighbouring~~ neighboring bits and three of which being the central-row bits of said hexagonal cluster, said three bits being set by the bits of the two states constituting each of the branches to be considered in the Viterbi trellis of the one-dimensional row-based Viterbi bit detector.

17. (Currently Amended) ~~Method~~ The method as claimed in claim 15, wherein the two primary ~~neighbouring~~ neighboring bits of the hexagonal cluster located in the upper and lower primary

~~neighbouring~~ neighboring bit row, respectively, are grouped as a primary ~~neighbouring~~ neighboring bit unit together with one bit of the next ~~neighbouring~~ neighboring bit row constituting a bit unit consisting of 3 bits, each bit unit being surrounded by nine ~~neighbouring~~ neighboring bits, six of which being secondary ~~neighbouring~~ neighboring bits, and three of which being the central-row bits of said hexagonal cluster, said three bits being set by the bits of the two states constituting each of the branches to be considered in the Viterbi trellis of the one-dimensional row-based Viterbi bit detector.

18. (Currently Amended) ~~Method~~ The method as claimed in claim 16, wherein the bit values of the secondary ~~neighbouring~~ neighboring bits being the ~~neighbouring~~ neighboring bits of the primary ~~neighbouring~~ neighboring bits not belonging to the central row of said hexagonal cluster are determined by threshold detection using a slicer level.

19. (Currently Amended) ~~Method~~ The method as claimed in claim 8, wherein said branch metrics are calculated as an expectation value, in particular the average taken over all possible bit values of said secondary ~~neighbouring~~ neighboring bits using soft-decision information available for said secondary ~~neighbouring~~ neighboring bits.

20. (Currently Amended) ~~Method~~ <u>The method</u> as claimed in claim 1, wherein N is 3 yielding a three-dimensional lattice of bits.

21. (Currently Amended) ~~Method~~ <u>The method</u> as claimed in claim 1, wherein said row-based one-dimensional Viterbi bit detection method is applied iteratively and wherein preliminary bit decisions on the primary ~~neighbouring~~ <u>neighboring</u> bits are obtained from the output of said row-based one-dimensional Viterbi bit detection methods in a previous iteration.

22. (Currently Amended) <u>A</u> Viterbi bit detector for detecting the bit values of bits of a channel data stream stored on a record carrier along an N-dimensional channel tube, N being at least two, of at least two bit rows one-dimensionally evolving along a first direction and being aligned with each other along at least a second of N-1 other directions, said first direction together with said N-1 other directions constituting an N-dimensional lattice of bit positions, <u>said Viterbi bit detector</u> comprising a Viterbi bit detection unit for application of a row-based one-dimensional Viterbi bit detection method independent for each of the bit rows of said channel tube, <u>said Viterbi bit detection unit</u> comprising:

– means for ~~calculation of the~~<u>calculating</u> branch metrics for all possible state transitions in a Viterbi trellis of a one-

dimensional row-based Viterbi detector, said transitions representing a number of subsequent bits in said bit row, said bits being the central-row bits of a cluster of the N-dimensional lattice of bits, said ~~calculation~~ calculating being based on the difference of the received HF signal value with respect to a reference level, wherein said reference level depends on all bits of said cluster, said cluster comprising, in addition to the central-row bits, a number of primary ~~neighbouring~~ neighboring bits in each of a number of ~~neighbouring~~ neighboring bit rows on each side along said N-1 other directions of said central bit row along which the one-dimensional Viterbi bit ~~detection method~~detector is applied, and wherein preliminary bit decisions for the primary ~~neighbouring~~ neighboring bits in the ~~neighbouring~~ neighboring bit rows are used for determining the reference level to be used for calculating said branch metrics~~,~~ ; and

– means for ~~selection of~~selecting the bit value for the central bit of said cluster of the N-dimensional lattice of bits, corresponding with said received HF signal value, ~~is~~ based on the calculated branch metrics.

23. (Currently Amended) ~~Bit~~ The bit detector as claimed in claim 22, wherein said ~~selection~~ selecting means ~~comprise~~ comprises add-compare-select units and back-tracking units.

24. (Currently Amended) ~~Method of reproduction of~~A method of reproducing a user data stream, ~~which is~~said user data stream being error correction code and modulation code encoded into a channel data stream and stored on a record carrier, said reproducing method comprising~~ a bit detection method as claimed in claim 1 for detecting the bit values of bits of said channel data stream~~ a Viterbi bit detection method for detecting the bit values of bits of the channel data stream stored on the record carrier along an N-dimensional channel tube, N being at least two, of at least two bit rows one-dimensionally evolving along a first direction and being aligned with each other along at least a second of N-1 other directions, said first direction together with said N-1 other directions constituting an N-dimensional lattice of bit positions, a modulation code decoding method and an error correction code decoding method,

wherein said Viterbi bit detection method comprises the steps of:

applying a row-based one-dimensional Viterbi bit detection method independent for each of the bit rows of said channel tube;

calculating branch metrics for all possible state transitions in a Viterbi trellis of a one-dimensional row-based Viterbi detector, said transitions representing a number of subsequent bits in said bit row, said bits being the central-row bits of a cluster of the N-dimensional lattice of bits, said calculating being based on the difference of the received HF signal

value with respect to a reference level, wherein said reference level depends on all bits of said cluster, said cluster comprising, in addition to the central-row bits, a number of primary neighboring bits in each of a number of neighboring bit rows on each side along said N-1 other directions of said central bit row along which the one-dimensional Viterbi bit detection method is applied, and wherein preliminary bit decisions for the primary neighboring bits in the neighboring bit rows are used for determining the reference level to be used for calculating said branch metrics; and

selecting the bit value for the central bit of said cluster of the N-dimensional lattice of bits, corresponding with said received HF signal value, based on the calculated branch metrics.

25. (original) ~~Reproduction~~ A reproduction device for reproduction of a user data stream, ~~which is~~said user data stream being error correction code and modulation code encoded into a channel data stream and stored on a record carrier, said reproduction device comprising a ~~bit detector as claimed in claim 22 for detecting the bit values of bits of said channel data stream~~ Viterbi bit detector for detecting the bit values of bits of the channel data stream stored on the record carrier along an N-dimensional channel tube, N being at least two, of at least two bit

rows one-dimensionally evolving along a first direction and being aligned with each other along at least a second of N-1 other directions, said first direction together with said N-1 other directions constituting an N-dimensional lattice of bit positions, a modulation code decoder and an error correction code decoder, wherein said Viterbi bit detection unit comprising:

means for calculating branch metrics for all possible state transitions in a Viterbi trellis of a one-dimensional row-based Viterbi detector, said transitions representing a number of subsequent bits in said bit row, said bits being the central-row bits of a cluster of the N-dimensional lattice of bits, said calculating being based on the difference of the received HF signal value with respect to a reference level, wherein said reference level depends on all bits of said cluster, said cluster comprising, in addition to the central-row bits, a number of primary neighboring bits in each of a number of neighboring bit rows on each side along said N-1 other directions of said central bit row along which the one-dimensional Viterbi bit detector is applied, and wherein preliminary bit decisions for the primary neighboring bits in the neighboring bit rows are used for determining the reference level to be used for calculating said branch metrics; and

means for selecting the bit value for the central bit of said cluster of the N-dimensional lattice of bits, corresponding

with said received HF signal value, based on the calculated branch metrics.

26. (Cancelled).

27. (Currently Amended) ~~Optical~~ An optical recorder comprising a Viterbi bit detector for detecting the bit values of bits of a channel data stream stored on a record carrier along an N-dimensional channel tube, N being at least two, of at least two bit rows one-dimensionally evolving along a first direction and being aligned with each other along at least a second of N-1 other directions, said first direction together with said N-1 other directions constituting an N-dimensional lattice of bit positions, ~~comprising~~ said Viterbi detector comprising a Viterbi bit detection unit for application of a row-based one-dimensional Viterbi bit detection method independent for each of the bit rows of said channel tube, said Viterbi bit detection unit comprising:

– means for ~~calculation of the~~calculating branch metrics for all possible state transitions in a Viterbi trellis of a one-dimensional row-based Viterbi detector, said transitions representing a number of subsequent bits in said bit row, said bits being the central-row bits of a cluster of the N-dimensional lattice of bits, said ~~calculation~~ calculating being based on the difference of the received HF signal value with respect to a

reference level, wherein said reference level depends on all bits of said cluster, said cluster comprising, in addition to the central-row bits, a number of primary ~~neighbouring~~ neighboring bits in each of a number of ~~neighbouring~~ neighboring bit rows on each side along said N-1 other directions of said central bit row along which the one-dimensional Viterbi bit ~~detection method~~detector is applied, and wherein preliminary bit decisions for the primary ~~neighbouring~~ neighboring bits in the ~~neighbouring~~ neighboring bit rows are used for determining the reference level to be used for calculating said branch metrics~~,~~ ; and

– means for ~~selection of~~selecting the bit value for the central bit of said cluster of the N-dimensional lattice of bits, corresponding with said received HF signal value, ~~is~~ based on the calculated branch metrics.